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PNEUMONIA - especially as met with in South African
Natives employed on the Rand Mines.

It is a well established fact that the Native Races of South Africa and their descendants in other parts of the World are peculiarly liable to attacks of Pneumonia, and that as regards this disease the black races show a much greater mortality than the white. In the United States of America these facts are still undisputed though there the Negro has had the advantage of many scores of years of acclimatisation, and Professor Osler in his Text Book gives proof of this greater mortality by stating that the ratio of deaths in the United States was 278.97 Blacks to 182.24 Whites. In South Africa there is no question about the extreme susceptibility of Natives to Pneumonia and in the Transvaal, in prewar days, and in the two years following the war, the proportion of fatal cases was undoubtedly large, but the Natives were then much affected with scurvy and thus more liable to the attacks of such a disease as Pneumonia. With, however, better housing, a much needed enlargement of diet, well equipped hospitals, and good nursing, the death rate has gone down considerably and will now bear comparison with the rates of large hospitals in any part of the World. While this predisposition of the black to pneumonia is undoubted, it is difficult to account for it satisfactorily.

The South African Native has proportionately to his size a smaller chest measurement, smaller expansion and naturally also smaller lungs than the white man, and

and while this may be an important factor, the principal reason is more likely to be found in an article by Fragale in Il Policlinico of May 1907, where he states that, "in old people, and in alcoholic, malarial, and cachectic people, and in those already suffering from other diseases, the diplococci multiply rapidly and enormously, and develop great virulence."

Now the majority of the Natives working on the Rand come from malaria infested districts :- Portuguese East Africa, Mozambique, Quilimane, Damaraland, etc., where they have incurred malarial infection ; they are practically all alcoholic, and at least 50% of them are suffering from Ankylostomiasis which renders them cachectic and anaemic ; thus they conform to this statement of Fragale's which may account for the heavy incidence of this disease on the Rand where it frequently occurs in epidemic form and is of an acutely infectious nature.

Taking the Natives employed on one Mine only we find that out of a total of 4,261 on the Company's Book for 1907, 2,675 are from Malarial Districts, and 1,586 are from Countries which may as a whole be classed as non-malarial.

Of the 2,675 malarial boys, 1,402 were East Coast boys from Portuguese Territory, principally Machopies, Nyambaans, and Shangaans, 445 were Zulus from Natal, 316 Mozambiques, 267 Damaras from German South West Africa, 161 Northern Transvaal boys, and 84 from various other parts ; while of the 1,586 non-malarial boys there were 958 Cape Colony boys, mainly Mxosas and Pondos, 515 Basutos and 113 Swazies.

During the course of the year 1907 there were 147 cases of pneumonia on the Mine, and of these the

the malarial boys provided 135 cases i.e. 5.05% of these boys contracted pneumonia. The other 12 cases occurred among the non-malarial boys of whom only 0.75% acquired pneumonia.

Below I append a table showing the comparative prevalence of pneumonia in the different tribes.

<u>Locality</u>	Malar.or Non Malar.	No.of Boys.	Pneum. Cases.	P.C.	Total Deaths.	Deaths per thousand.
E.Coast.	Malar.	1402	64	4.56	5	3.56
C.Colony.	Non.	958	9	0.94	1	1.04
Basutoland.	Non.	515	0	0.00	0	0.00
Zululand.	Malar.	445	6	1.33	1	2.25
Mozambique.	Malar.	316	32	10.12	6	18.99
Damaraland.	Malar.	267	11	4.12	2	7.49
Transvaal.	Malar.	161	21	13.04	2	12.42
Swaziland.	Non.	113	3	2.65	1	8.85
Others.	Malar.	84	1	1.10	0	0.00

Thus the highest death rate is among the Mozambiques who besides being malarial also show 70% affected with ankylostomiasis. The Transvaal boys employed on the Mines are mainly Msutus, (an offshoot from the original Basutos), but they have physically degenerated, are now a weedy race coming from a malarial district, and badly infected as well with syphilis.

During the year 1907 with a monthly average of 2,772 Chinese in the Compound there were only 13 cases of pneumonia without a single death.

From a territorial analysis of mortality among natives employed in all Mines of the Transvaal for the year ending June 30th. 1907, I take the following figures of deaths from pneumonia for comparison.

<u>Locality.</u>	<u>No. of deaths.</u>	<u>p.c.(1).</u>	<u>p.c.(2).</u>
East Coast	733	59.4	32.3
Cape Colony	63	5.1	21.3
Basutoland	77	6.2	56.2
Zululand	20	1.6	24.4
Mozambique	59	4.8	28.8
Damaraland	7	.6	16.3
Transvaal	139	11.3	47.4
Swaziland	3	.2	20.0
Others	134	1.8	53.4

P.C.(1):- Percentage of deaths among Natives from each territory to total number of deaths from each cause during year.

P.C.(2) :- Percentage from each cause to total number of deaths which have occurred among each tribe during the year.

Dividing the above as before into malarial and non-malarial boys we find from P.C.(1) column a percentage of 13.1 deaths among malarial boys to a percentage of 3.8 among non-malarial boys.

ETIOLOGY.

Age :- this is of no importance for the Mine Natives are in a great majority of cases able bodied men more or less in the prime of life, but out of 162 cases the average age is 24 years.

Sex :- this is also of little importance but it is interesting to note that though there may be hundreds of Native women round a Mine one is rarely called upon to

to treat any of these for pneumonia. The male Native is as a rule thin and wiry, while the female is well furnished with a supply of adipose tissue particularly in the way of pendulous breasts, and this difference between the two sexes probably accounts for the relative freedom from pneumonia possessed by the female. In this connection the Chinaman on the Mines who has also a well developed chest scarcely ever gets pneumonia.

LOCATION. The Native on the Mine is much more liable to pneumonia than the native in his kraal, probably from their being segregated together in large numbers in the Mine Compounds.

Personal Condition. The Native is very fond of alcohol in any shape or form and spends his Sunday in absorbing as much of the various deleterious compounds sold to him as he can conveniently or inconveniently accommodate. The native also has a habitual disregard for the use of warm clothes; he considers a thin macheca all that is necessary for the coldest day.

Trauma or Contusion Pneumonia. I have seen few such cases and the Natives are always liable to blows on the chest while working underground. Several times I have had a native develop pneumonia after having (as he alleged), been struck on the chest by his white boss, but as the native invariably blames his white boss for all he can, I have placed small credence on these statements.

Cold. It has been proved that cold in itself cannot cause pneumonia, but by lowering the body resistance it predisposes to the disease. This seems well proved by the fact that boys coming to the Mines from the more tropical parts of Central

Central Africa :- Nyassaland, British Central Africa, Mozambique, etc. :- are especially predisposed to attacks of pneumonia of a very deadly kind. So well recognised is this fact that boys are not recruited from these parts unless at the beginning of summer, so that they may have three or four months in which to get acclimatised before the onset of winter with its bitterly cold months. Even then the mortality is much greater among them than among other tribes.

Climate and Season. :- of these two the latter is much the more important as the intense cold of the Transvaal nights must be a strong predisposing cause towards pneumonia, for the boys on night shift come up from the warmth underground, wet with either mine water or perspiration, and then have to walk $\frac{1}{4}$ or $\frac{1}{2}$ a mile to the Compound before they can change their clothes. Then in the Winter dust storms are frequent and there is always a fresh outbreak of pneumonia after a week of dust. It is questionable if the pneumococci are present in the dust, but more likely the dust getting into the lungs causes a breach of tissue continuity, and thus allows of the entrance of the infecting agent. Out of the 147 cases of pneumonia during 1907, 61 occurred in the Summer months, and 86 in the Winter months, but the number of cases in Summer is probably heavier than usual owing to an epidemic in December, that month though probably the warmest in the year providing 24 cases of which a majority was among a batch of newly arrived Mozambiques. In the Transvaal there are practically only two seasons, Summer and Winter, and at the beginning of each there is a period when there is a very marked difference between the day and night temperatures.

Thus at 5.p.m.a person may be perspiring in a broiling sun,while an hour later the air is distinctly cold,and this sudden change is the cause of many a chill which leads in its turn to influenza and pneumonia.

Influenza while not so common as in Great Britain pays frequent epidemic visits to this Country,and here also the influenzal attack is commonly followed by pneumonia. I have noticed on the Mines that though both races are equally liable to attacks of influenza they seldom both have them at the same times. I am unable to say which gets the disease first and why there should be this difference,but my attention was first called to this fact several years ago by an experienced Compound Manager,and I have noticed the difference in many subsequent epidemics of influenza.

BACTERIOLOGY.

The pneumococcus is found in the sputum of every pneumonic patient but very often it is accompanied by streptococci in considerable numbers. Three diseases from which a Kaffir-Chinese Hospital is practically never free, are pneumonia,erysipelas,and septicaemia. There seems little doubt that they go hand in hand,and it is of great interest to note that while the Chinaman seldom gets pneumonia,on the other hand he ^{is} ~~he~~ much more susceptible than the Kaffir to septicaemia and erysipelas. This is not my experience alone,but that of every medical man on these fields. The relationship between the pneumococcus and the streptococcus has always been regarded as very close,and a recent paper in the November 1907 number of the Journal of Infectious Diseases by Buerger and Ryttenberg of New York, is of great interest in this connection. In the course of

of some experiments it was found that as regards cultural properties although most pneumococci fermented inulin, certain streptococci also possessed this power and that some pneumococci failed to break up this carbohydrate in every generation ; further that whereas streptococci caused precipitation in the glucose-serum-agar, only a very few pneumococci did so ; and finally that streptococci usually produced haemolysis in blood media, but that pneumococci either did not cause this at all or only did so in the blood in which they were found. Working thus with what they term a Streptococcal and a Pneumococcal cultural type, they conducted a series of experiments by inoculating animals with organisms obtained from cases of (1) puerperal pneumococemia, (2) chronic endocarditis, lobar pneumonia and pneumococemia, (3) acute osteomyelitis, (4) retropharyngeal abscess. Their observations on these four cases are of great interest and are thus briefly recorded by them.

Observations upon Case 1. Puerperal pneumococemia ; streptococcus cultural type in three successive blood cultures and in a metastatic^{at} abscess ; conversion into pneumococcus cultural type by passage through mice ; failure to change properties of strain isolated from metastatic abscess.

Observations upon Case 2. Chronic endocarditis, lobar pneumonia and pneumococemia. Streptococcus cultural type ; conversion into pneumococcus cultural type.

Observations upon Case 3. Acute osteomyelitis ; pneumococcus with typical capsules and streptococcus cultural properties ; it remained unchanged after repeated animal inoculation ;

a later culture obtained at a second operation showed typical pneumococci both as to morphology and cultural characteristics.

Observations upon Case 4. Retropharyngeal abscess ; pneumococcus of the mucoid type with typical morphology, but possessed of the streptococcus cultural type ; failure to convert it into the pneumococcus cultural type by repeated animal inoculations.

While they had found it possible to convert certain strains from the atypical into the typical variety by means of animal inoculation it was not found possible to convert the atypical into the typical variety by means of suitable media obtained from human beings e.g. ascitic fluid and blood. Their observations on the morphology and cultural features of pneumococci in human exudates and human blood led them to the conclusion that wide variations from the type may occur, and that the human body exerts a considerable influence upon the fermentative properties of these organisms.

The cultural properties of pneumococci derived from the same source and isolated at different periods in the course of the patients disease may vary, for the typical pneumococcus morphology may occur with either the streptococcus cultural type or the pneumococcus cultural type. Pneumococci of the streptococcus cultural type may be possessed either of the morphology of typical pneumococci or ordinary streptococci.

It was possible to convert some but not all strains possessing the streptococcus cultural type into the typical pneumococci by inoculating into white mice but all of the pneumococci isolated from one case may not permit of this change.

Fragale in an article in Il Policlinico of May 1907 describes the results of a series of experiments he carried out with pneumococci obtained from the blood of pneumonia patients. He injected blood taken from the median vein directly into a rabbit, or he injected blood serum after a brief centrifugalization. When the rabbit showed signs of infection the diplococcus was sought for in its blood and broth cultures were made. Another method was to aspirate a few drops of blood from a vein and make broth culture.

These were injected into rabbits from which the diplococci were afterwards isolated and their virulence estimated by the length of time between injection and the death or severe illness of the rabbit. There was no connection between the number and virulence of the germs and the extent of the pulmonary inflammation. Cases involving a great volume of lung and ending in death were associated with the presence of only a few and apparently not very virulent organisms in the blood. There were also cases with very slight physical signs of the disease in the lungs accompanied by very numerous and very virulent pneumococci in the blood, the cases ending in recovery. But usually with virulent organisms even in small numbers in the blood, the prognosis is bad and with numerous very virulent organisms, very bad. The diplococci were found in the blood of 41 out of 50 cases examined, and just before death there was a constant increase in the number and virulence of circulating organisms. Diplococci were found in the urine in 27 out of 50 cases, usually in small numbers and in the later days of disease. These 27 cases include 5 out of 9

in which diplococci were never found in the blood.

Diplococci were never found in the urine in fatal cases, nor in those cases in which they were found in the blood many days after the crises. For periods of from 9 to 45 days after the cessation of pyrexia, germs of low virulence and often degenerate in form could be recovered from the blood. In some cases after cultivation on broth these germs recovered their virulence and their lanceolate and capsulated forms. In the great majority of all cases diplococci were found in the blood for a few days at least after the fever ceased. In 3 cases a fresh attack of pyrexia began while numerous virulent diplococci were still present in the blood. Two of these cases were fatal and post-mortem showed no fresh pulmonary lesions.

It is now believed that the pneumonic attack consists of an overwhelming proliferation of the pneumococcus within the body, and that it ends with the dying off of the microbe and its clearance by phagocytes. Dr A.H. Smith of New York regards the proliferation as a localized process, its site the lobe affected, and its nutrient breeding ground the inflammatory exudate in the air cells. His inferences are drawn from the following considerations ; in other pneumococcus affections, such as primary pneumococcus arthritis, or peritonitis, or meningitis, lesions are found elsewhere, but the lung may be perfectly normal. The lung is therefore presumably not in those cases the breeding ground, whilst everything points to the special organ which presents the inflammatory change being the seat where the

the micro-organism multiplies. In pneumonia it would therefore be warrantable to conclude that the micro-organic growth has its main seat in the lobe affected, and that its amount bears some proportion to the amount of the inflammatory exudate. This is of great importance with regard to treatment.

MORBID ANATOMY.

An analysis of 100 consecutive cases of pneumonia post-mortems brings the following facts before us. In 62 cases both lungs were affected ; in 24 the right lung only, and in 14 the left only. In 51 cases the entire lung was involved ; in 12 the lower lobe of one lung only ; in 2 one apex only, and in 2 both apices only ; in 18 both bases only. In one case there was an abscess at the base of the right lung, while in another the right lung was found to be collapsed to the size of a man's hand, and lying against the vertebral column. In one case there was engorgement only ; in 35 cases grey and red hepatization together ; in 28 cases red hepatization only ; in 23 grey hepatization only. There were four cases where both lungs were solid with a mixture of red and grey hepatization. In one case both lungs were found to be in a condition which can best be described as waterlogged. In the 100 autopsies 71 showed traces of a recent or old pleurisy. In 35 this was on both sides ; in 20 on the right side and in 16 on the left. There were 10 cases of pericarditis, in seven of which there was double pneumonia while the remaining three were right sided.

SYMPTOMS & PHYSICAL SIGNS.

These present so few differences in the native from those commonly met with in white people, that it will not be necessary to go into them in detail but only to mention the more salient points of similarity or difference. In the average native clad only in his thin "macheca" or kilt, and with his chest exposed, pneumonia is easily recognised by the rapid short respirations and by the pained expression of his face. The hacking cough is soon pronounced and the sputum becomes characteristically rusty. The temperature seldom goes over 105 F. and the average height is between 102 and 103 F. The full bounding pulse is common and may in itself lead one to suspect the disease before the physical signs are pronounced. In many cases the pulse fails early in the disease and the heart does not respond to stimulation. So far as my experience goes in no other disease except scurvy are cases of sudden death from heart failure so common. The course of the fever as a rule is from 5 to 8 days and it is the exception to find a case persisting longer. Six days is the average duration. From the examination of the blood I have never found any shortage of red blood corpuscles except in patients who showed marked signs of anaemia probably due to ankylo-stomiasis. Leucocytosis when present has always been slight.

COMPLICATIONS.

Pleurisy as evidenced by the post-mortem results is a very frequent complication. Cases of pleurisy with any considerable amount of effusion are rare, and when such do

do occur, it is the exception for them to give any trouble.

Empyema is comparatively rare. I have seen two or three cases in one year and again I have gone for three years without seeing a single case. They do not answer well to resection and drainage.

Tuberculosis is yearly becoming a more common complication. In some cases it has undoubtedly been pre-existent, but in many it follows immediately on the pneumonia and I have known a fatal result occur within three weeks.

Silicosis is a dangerous complication as the strength and expansile power of the lung is already impaired but as a rule few natives stay long enough on the Mines to acquire this disease.

Pericarditis is fairly common and is usually accompanied by the effusion of a large amount of fluid.

Endocarditis is very rare,

Hiccough is often a distressing complication in the later stages of the disease.

Acute Rheumatism as a complication or in fact as a separate entity is practically unknown and I do not remember ever having seen a case of rheumatic fever in a native.

Meningitis is by far the most serious complication, as a rule it occurs late in the disease when the patient appears to be well over the pneumonia and on the road to recovery. It is especially common in those epidemics which are accompanied by a discharge from the eyes and nose,

thus pointing to the probability of the infection being through the nasal passages. In the native excessive secretion from the eyes shows itself distinctly by the track of salt down the cheek.

Diarrhoea is another serious accompaniment and is a common associated cause of death.

Delayed resolution-with some epidemics this is common, and a patient may go on running a temperature for weeks after his acute symptoms are over. In such cases tubercle bacilli are never found in the sputum and in the majority of such cases the patient eventually makes a complete recovery.

Jaundice is a common complication which is perhaps not to be wondered at considering how few natives possess a normal liver. Probably the jaundice is haematogenous in ~~the~~ origin.

CLINICAL VARIETIES.

Double Pneumonia is not an uncommon occurrence and I have several times had cases in which one lung was first involved, the patient had his crisis in the ordinary course and then next day the other lung has become involved and the disease run the usual course till the second crisis occurred.

Central Pneumonia :- Such cases are not unusual and I have had patients in whom the temperature and rapid breathing convinced me pneumonia was present, and yet there were no physical signs till the sixth or seventh day. In one such case where the temperature and symptoms were suggestive of pneumonia and where there were no physical signs, I had great difficulty in persuading my patient to stay in hospital.

He said he did not feel quite well but was well enough to go to work. On the seventh day when he had his crisis he developed a patch of pleural friction which reconciled him to staying a day or two longer in hospital.

Secondary Pneumonia :- This is uncommon except after Influenza. I have had one case following on a case of Septic Necrosis of the skull bone.

One day or Abortive Pneumonia :- Such cases are freely met with in different epidemics.

Apyrexial Type :- Is uncommon and I have never seen it apart from cases in old natives of whom we have few on the Mines.

Apical Pneumonia :- Are very common and do not give more trouble than the ordinary type.

PROGNOSIS. On the Rand this depends on many things. Firstly, the attacks in different years vary greatly in severity. Age has little to do with the question as few old boys are recruited for mine work and when such are recruited, they are generally given light surface work where there is little chance of their incurring chills or acquiring infection. The duration of a boy's stay on the Mine is of importance, for the new comer succumbs rapidly to the disease, while the boy who has been four to six months on the Mine stands a much better chance for he has not only built his body up but he had also become somewhat acclimatised. On the other hand a boy who has been on the Mines for some years has probably a certain amount of Silicosis present which may greatly minimise his chance of

of recovery. Also as before stated the average native is an alcoholic subject and his power of resistance is thus considerably lessened. Cases in which Meningitis occurs are almost invariably fatal ; so far in five years experience I have not seen a single case recover.

DIAGNOSIS.

This is easy because the native on the Mine is a healthy young or middle aged man who is unlikely from the hard nature of his work to have any serious disease present which is likely to complicate the diagnosis. Cerebral cases may be mistaken for meningitis which is common on the Rand both as a separate disease caused by the pneumococcus as well as by the diplococcus intracellularis of Weichselbaum or which may be present as a complication of the already existing pneumonia. In older mine boys an advanced silicosis may occur and cases of this kind can only be distinguished by the history, the long continuance of the temperature, and by microscopic examination of the sputum. It is common in the out patient department of a Kaffir hospital to get Natives complaining of one of two things :- "Slabbeis" or "Ingazi". Slabbeis means a sharp pain in the side and proportionately comparatively few of these develop into pneumonia. This pain may last for three or four days, is not more common on one side than another and appears to incapacitate the native for work for the time being. It may appear on either side but seldom on both at the same time, and is not more common in boys working underground than in boys working on the surface. So far as percussion or

or auscultation shows it is in no way connected with the lungs. It may be a splenitis or a hepatitis as it is exceptional not to find a native with one or both of these organs normal.

Ingazi signifies blood and as a symptom is apparently present without pain, the blood is inside and remains there although the native tries to cure this condition by cupping himself with a cows horn. The patient never coughs or spits any blood up, and yet he is quite convinced that blood is there and that it is the cause of his trouble. Pain may or may not be present at the same time.

PROPHYLAXIS.

The question of the prevention of Pneumonia on the Mines is a very important one. The two principal places where a boy may acquire the disease are, (1) in the Compound, (2) at his work. In the Compound the boys are generally allocated rooms according to their tribes, and a single room naturally houses boys who are both on day and night shifts. The native is very fond of expectorating on the floor, and no amount of discipline can check this habit. All the rooms in the Compound are swept out each day by native sweepers, and unless the sleeping boys are turned out, the germs have thus an excellent chance of entering the sleepers lungs. Sawdust damped with disinfectant checks this evil to a certain extent but not entirely, and even when the boys are turned out of the rooms for the sweeping process, they return to their beds long before the dust has settled. It would be excellent but

but difficult to arrange to have only boys on night shift in one room, and boys on day shift in another, and to have these rooms cleaned out as soon as the boys have gone on shift. As regards the Compound itself, the rooms in which the boys are housed should be well ventilated and well lighted. The floor should be of some impervious material such as cement, and this cement should be rounded off at the wall and carried up the wall for three or four inches, so that they can be washed and scrubbed without the filth adhering to the walls. In addition there should be a general slope of the cement floors towards the doors to facilitate free washing out. The sleeping bunks should be as simple as possible, and made so that they can be easily taken to pieces and removed. Arrangements should also be made for the thorough disinfection of clothing and blankets.

At work much could be done by providing the boys with a pure water supply. The native is accustomed to drinking impure water, and does not consider pure water such a blessing as to go out of his way to any extent to get it. Most Mines strike water somewhere or other in their underground workings and though this is pure enough at its outset, it does not proceed far before it becomes muddy and contaminated. The native who uses water to lay the dust in the hole he is drilling naturally takes it at the nearest spot rather than walk two or three hundred feet along the drive to the fountain head. His method of using this water for moistening purposes is simple if original. He fills his

his mouth with the fluid and ejects a stream towards the mouth of the hole. A mouthful of water lasts quite a long time and if he is hot with his work he naturally swallows a little now and then. Three French observers (Calmette, Vanstemberghe and Grysez in the Bull. de Soc. de Biologie de Paris July 1905), have lately proved experimentally that by introducing a pneumococcus strain into the stomach of the guinea pig by means of an oesophageal tube, they could trace the pneumococcus through the intestinal lining epithelium via the thoracic duct and heart to the pulmonary capillaries.

One can thus imagine what a fruitful source of infection a mine water contaminated by pneumococcal sputum might be. A plentiful supply of pure water underground would obviate this danger almost entirely and I have recently had a somewhat convincing proof of this fact on one of my mines, where I was having more cases of pneumonia than I thought proportionate. I went into all the sources of infection and after discovering that all my cases were in boys working underground in a wet shaft where there were two or three inches of water on the bottom, I persuaded the management to provide the boys with "billies" or water cans which they were made to fill before going underground. The effect was instantaneous, and since the adoption of this idea some six months ago I have not had a single case of pneumonia among the boys working in that shaft. In a case of this kind it was impossible to lay water pipes to the bottom of the shaft as the blasting would break them up, and the use of the "billies" was the only other feasible method of getting the

the boys to use a supply of pure water. Steps should also be taken to induce the native to adopt a warmer method of clothing himself, and he should be compelled to change his damp mine clothes for a dry suit in the warm change-house at the shaft head as soon as he comes up from the mine. He would thus avoid the chill which must follow on a walk to the Compound in damp clothing in the bitterly cold frosty nights and mornings which prevail in the Transvaal winter. Underground also he should be taught the danger of lying down and resting in the draughty drives and stations while waiting for his ganger to come down, or for the cage to take him up to the surface when his day's work is done. The proper disinfection of urine and faeces is very necessary as is shown by the presence of pneumococci in the urine of people who have recovered from an attack of pneumonia. Taking into consideration also the natives addiction to alcohol, a glass of brandy given to each boy as he comes to the surface might be of conceivable benefit.

TREATMENT.

Nowhere in the world probably is there such scope for experimenting in the treatment of pneumonia as on the Rand, and nowhere probably are statistics more fallacious, for in dealing with pneumonia statistics each year so many different things have to be taken into consideration. As Dr Ewart in the January 1908 number of Folia Therapeutica says "alone the clinical method of close observation of the individual cases is competent to report on finer questions as to the relative behaviour of remedies towards the microbe and its host.

The statistical method is suited only for the study of great

great averages, such as the average duration or the average mortality of the disease. At bottom its clinical inadequacy is a question of epochs and of stages. Statistics are of the past, an immutable record of its imperfect knowledge and its errors. Clinics are the future!"

With regard to treatment on the Rand, Three points of great importance are, (1) the virulence of any particular epidemic, (2) the question as to whether the boys have been on a mine some time, or have recently arrived, (3) the number of boys from each tribe or country on any given mine. Thus a Doctor on one mine might obtain excellent results from the use of a drug which gave no satisfaction by its use to his near neighbour. The various methods of treatment as carried out on the Rand might be classified under the headings of, (1) general, (2) special.

General treatment.

(1) Fresh air :- this is undoubtedly of great help and the raw Kaffir prefers to treat himself in the open air and sunshine. Whether it is his natural love of warmth or whether he believes in the beneficial effects of fresh air it is difficult to say. The hospital wards in which the pneumonia patients are nursed should be well ventilated and well lighted and provision should be made for the beds being carried out on to a broad verandah where they can be sheltered at the same time from the harsh winds.

(2) Diet :- a plentiful supply of fresh milk is a great essential and this should be aided by nourishing soups. The average Kaffir is dissatisfied with a hospital diet of milk alone, but will gladly take a liberal supply of rice or

or mealie meal in addition. Some crave for even more than this and do well apparently on their ordinary diet of meat, beans, and bread.

(3) Diaphoresis :- the Kaffir's habit of sleeping entirely under his blanket thus turning it into a tent produces a plentiful diaphoresis, though his lungs probably suffer from the rebreathing of vitiated air.

(4) Bleeding :- it is more difficult to decide on the cases where free bleeding will help for the duskiness of the native's skin and even of his mucous membrane withdraws a valuable sign, but I have had cases where free bleeding and a use of saline infusions have apparently been of great help in relieving the overtaxed heart and lessening the toxæmia.

(5) Drugs :- it is only reasonable to expect that drugs should be used in the treatment of pneumonia from an antiseptic point of view in the hope that a sufficiency should reach the lung to kill the pneumococci. To attain this purpose such a drug should be given frequently, at least every two hours. Dr Watt of the Simmer & Jack Mine has had most excellent results with the use of creasote itself or of its carbonate creasotal. On one Mine alone out of 106 consecutive cases he has only had four deaths and on other Mines he has had similar good results. On his recommendation I have lately given this drug a trial with much less satisfactory results as out of 100 consecutive cases I have had 14 deaths, but I was unfortunate in having to use it when the Mine was in the transition stage of exchanging Kaffirs for repatriated Chinese and numbers of Kaffirs were being recruited weekly, whereas his results were obtained on a Mine which had never reverted

reverted to Chinese labour and the incomers were more or less constant in numbers. Seeing turpentine highly lauded in the British Medical Journal as an "almost certain specific in cases of pneumonia" I gave it a thorough trial in 105 consecutive cases in which I had 13 deaths in all. Under what may be described as expectant medicinal treatment i.e. the use of mixtures containing ammon.carb., sodii bicarb. vin. ipecac. etc. according to the case I had nine deaths in 50 cases. Dr Turner of the Witwatersrand Native Labour Assn. who has been experimenting with Calcium Chloride as recommended by Sir T.Lauder Brunton tells me that he has been fairly successful with it, but it seems to me that the routine use of this drug is one that might be fraught with much danger. I have used it in cases where the lung has been in a waterlogged condition with excellent results, but in cases where the mucus is thick tenacious and of small amount, its use seems to me to be indefensible save on the grounds of its being a stimulant of the cardiac muscle, and even then it is questionable whether this benefit would counter-balance its other disadvantages.

Treatment of complications :-

(1) Heart Failure :- this is a condition which one must always be on the lookout for, and when it does set in I have found nothing more useful than Digitalis, Strychnine, and Alcohol, but the injection of normal saline solution and the use in certain cases of Calcium Chloride must also be kept in mind.

(2) Delirium :- for some reason apart, I think, from an excessive indulgence in alcohol a state of delirium is

is extremely common in pneumonia patients on the Rand, and this exhausting condition in these cases often helps to bring about a fatal issue. Of all the hypnotic drugs I have tried, I have been more successful with Veronal than any other, but in many cases where even this fails, recourse must be had to opium in some form either as Dover's Powder, or as Morphia used hypodermically.

(3) Hiccough :- failing success with Sedative stomach powders recourse must also be had here to Opium.

(4) Delayed Resolution :- in these cases having seen intramuscular injections of fibrolysin (a double compound of thiosinamin and sodium salicylate), recommended by Dr Crofton I intend giving it a thorough trial in future cases.

Special Treatment.

(1) Serum Therapy :- the great difficulty about serum treatment is pointed out by Dr Hadley who writes as follows in Hutchison and Collier's Index of Treatment which has just been published. "The use of serum therapy in patients suffering from pneumonia is rendered difficult by the fact that each individual breeds his own particular strain of pneumococcus. Bearing in mind this fact that A's pneumococcus does not protect B, and that it therefore becomes necessary to cultivate an individual's own organism for his own cure (a process which takes about fourteen days) it is obvious that this form of treatment will become more useful in lingering cases or for some of the more chronic complications." In 1904 I made use of Pane's Antipneumo-coccic Serum in thirty consecutive cases with only two deaths. These thirty cases were selected cases in which the

the temperature went over 103 F., the minor cases being treated by the ordinary expectant methods. I used the No.1 Serum as after trial I found it to be just as efficacious as the No.2 and much less expensive. I gave 10 C.C.as the dose with one injection daily in the majority of the cases and two daily in the more serious cases. Out of the 30 cases ten had only one injection,nine had two injections,eight had three injections,whilst three had four injections. With regard to the course of the disease in three cases it seemed to abort the attack at once and the temperature dropped suddenly to normal. It would oscillate slightly for a day or two,(thus showing that these were not true abortive cases),and then settle down at normal. In other cases the fall of the temperature was more gradual though the crisis seemed to be hastened.

Others again ran their full course with a gradual drop of temperature and a slight though distinct crisis at the end. There certainly was an effect on the temperature for in the whole series there was not a single case where a uniform high temperature was maintained. Both the fatal cases were double pneumonias and one in his delirium got out on to the veldt one bitterly cold winter's night and was found there next morning in a moribund state.

In the other fatal case a post mortem revealed phthisis with cavities in both lungs and an acute pericarditis as well with the effusion of a large amount of serum in the pericardial sac. By this treatment respiration seemed to be made easier and the heart's action was aided for the full bounding pulse was seldom felt. In one case where the

the patient was brought to hospital extremely ill and with and irregular heart, two injections caused the irregularity to disappear and the patient made a rapid recovery.

I gave up this method of treatment because
(1) of the expense which worked out at about £2 per patient.
(2) mainly of the difficulty in obtaining supplies of fresh serum.

Chiarolanza in the course of some experiments with regard to the effect of preventive inoculations against infection by streptococci and pneumococci made use of Pane's antipneumococcic serum in a series of 24 observations on rabbits infected with a virulent preparation of pneumococci. The 12 rabbits treated with serum all survived while the controls all died. In one case an immunized rabbit survived the injection of ten thousand times the minimum fatal dose. The same results were obtained whether the serum was injected twenty four hours before, or just before or just after infection.

Position Treatment :-

Dr Mathias of Kimberley has adopted a new method of treatment which he terms "Position Treatment".

He describes his method and results as follows.

"The whole plan of treatment is based on the idea that, as the lungs in this disease contain a fluid which gravitates to the dependent parts, the position of the patient's body should be so arranged that the fluid will gravitate from what were the lower parts into the large tubes, whence it may be coughed out. Each patient should be examined so as

as to ascertain which lung is effected to the greater extent. If, as is the case nine times out of ten, it is the right lung, the patient should be made to lie on his left side for half an hour or so, at a time ; he should then turn over on his face, and lie in that position as long as comfortable, being encouraged to cough and expectorate. If fairly robust, he should get on his knees occasionally, keeping his head as low as possible and cough vigorously, and every couple of hours, he should sit up and take a few deep inspirations to expand ^{the} lungs. As the left side must not be entirely neglected, the patient must occasionally lie on the right side. Simple though this treatment may appear, still it is most necessary that it should be carried out intelligently, and that each case should be considered separately, and the course of treatment adapted to the local and general conditions of each patient ; no hard and fast rules should be laid down for all cases, ~~there~~ being some which would probably derive no benefit from this "position treatment", for instance :- those in which the brain and heart are chiefly affected. To carry out this procedure thoroughly I think it would be necessary to have an attendant set apart specially for this purpose.

I began treating cases on this system in October last, but at first only those I thought most likely to be benefited. As its remarkable success soon became apparent, I began to use it in every suitable case, and soon my assistants became firm believers in its efficacy, and even the patients had to be at times restrained from overdoing the thing. I do not claim to cure every case in this way

way, but only to do a certain amount of good in almost all, as it is self evident that it must be beneficial to the patient's health to have removed from his lungs a large quantity of decomposing nitrogenous matter, which must tend to delay recovery, even if it does not prove fatal through disorganisation of the lungs. Since this treatment has been followed, we have not had one case which has become "chronic". Previously such cases were common, many of them being sent to the Kimberley Hospital, where they generally died; whilst others were allowed to return to their homes in an emaciated condition, probably with the same result. (The deaths amongst these "chronics" sent away should be included in estimating the mortality of this disease). The examination of the sputa of "chronics" by Dr Reid proved that they were not phthisical, as some supposed.

It is difficult to prove the efficacy of any remedy, as it is generally possible that the patients might have recovered without its aid, but, as evidence in favor of the value of the "Position Treatment", I have had three cases with symptoms of such a nature that they would have according to all previous experience died, who, however, became practically convalescent in less than a week.

In the Wesselton Hospital, out of 173 patients treated from the 1st. Jan. to 30th. June 1906, 38 died, being a mortality of 22%. 10 "chronics" died in Hospital (Carnarvon), and there were 11 "chronics" in the Compound Hospital when I took it over from Dr Wicks in August 1906, all of whom died. (previous to my appointment as Medical Officer).

Out of 182 patients treated from 1st. Oct. to 31st.

31st. Dec. 1906, 20 died, being a mortality of 11%.

These statistics seem very favourable, but they deal with too few cases to be in any way conclusive, especially as diseases are so often much more fatal at one time than another."

FINIS.